Conservation of Energy:

- We are concerned with conservation of mechanical energy.

- Kinetic and potential energies
- Energy is conserved when a closed system has no nonconservative forces acting in it.
- Nonconservative forces:

  friction, drag, applied

- Equation:

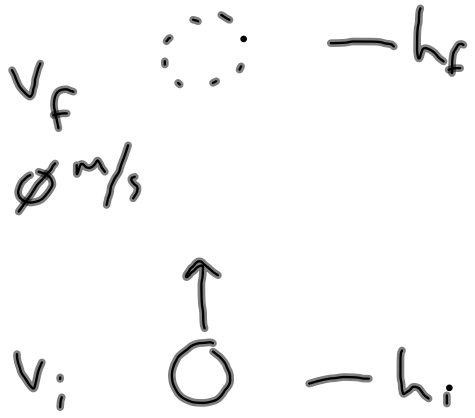
$$E_i = E_f$$

$$K_i + U_{gi} = K_f + U_{gf}$$

$$\frac{1}{2}mv_i^2 + mg h_i = \frac{1}{2}mv_f^2 + mg h_f$$

$$\frac{1}{2}v_i^2 + g h_i = \frac{1}{2}v_f^2 + g h_f$$

A person throws a ball directly upwards with an initial velocity of 15 m/s. How high does the ball go?



$$\frac{1}{2}v_i^2 + a_g \cancel{h_i}^{\emptyset} = \frac{1}{2}\cancel{v_f}^{\emptyset} + a_g h_f$$

$$h_f = \frac{v_i^2}{2a_g} \qquad v_f^2 = v_i^2 + 2a_g \Delta y$$

$$= \frac{(15\ m/s)^2}{2(9.8\ m/s^2)}$$

$$= 11.48\ m$$